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time, especially (p. 179) *Arcturus*: Anno 1690 $- 3^{s}$, $26' \, 30''$ to 1778, $+ 5^{s}\cdot 67$, and $23' \, 33''\cdot 7$. P. 176–9, details Plate 1.

Then follows another refutation of Father Hell, with a detailed description of the Mannheim Bird's mural quadrant, and observations therewith.

He then (p. 206) explains the other diagrams of Plate 2; and this is followed by further anti-Hellite arguments, with extracts from La Lande,* Tycho Brahé, Halley, ending with Mayer's insisting on his method being new, *truly useful and excellent*; so that by the *differences* of motions of stars to each other, we will sooner acquire a notion of their movements, than by the old method of contemplating the absolute displacements from a common fixed point.

14 *Feb.* 1876.

Preliminary Note on Photographing the Least Refracted Portion of the Solar Spectrum.

By Capt. W. de W. Abney, R.E.

Within the last two years there have been many attempts made to photograph the least refrangible rays of the spectrum; and though stated to have been accomplished by the elder Draper on a daguerreotype plate in the early days of photography, yet there is reason to believe that this was effected by the reversing action of these rays on slightly exposed sensitive iodide of silver, and that really no direct photographic impression had been obtained till Dr. Vogel published an account of a method for effecting this object in 1874. More recently, Capt. Waterhouse, of the Bengal Staff Corps, has followed up Dr. Vogel's researches, and with a larger share of success than the originator. Both these gentlemen have had resort to aniline dyes of varying colour, using it with the preservative to the plate; and they state that the red end of the spectrum is most sensitive when a red dye (naphthaline) or rosine is employed, and propound generally that the rays that can be photographed are dependent on the colour of the dyes employed: that colour, and not the ingredient added to the sensitive silver salt, is the essential.

Lately I have had occasion to investigate the subject, and have met with such good results that I desire to communicate a preliminary Note to the Society. I have carefully repeated the previous experiments of Vogel and Waterhouse, and only attained partial success with them, though there was sufficient evidence to show that with the dyes the desired end would be attained. Looking more carefully into the chemistry of the

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* *Vide* La Lande's *Bibliographia Astronomica*, p. 565. Refers to *Journal des Savans*, Feb. 1779.

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question, however, it struck me that the same results might be obtained by other means than colour, and experiments were undertaken with a large series of gum resins and other oxidised hydrocarbons (added to ordinary collodion), some colourless and some not. With every gum resin was obtained a considerable extension of the photographic spectrum below the lines *b*, and at length I procured a resin forming with silver a perfectly white compound that seems to be capable of taking an image far below the line A. At present, I find that the longer the exposure given, the greater the length of the spectrum impressed, and I believe that, with patience, a very large part of the absorption-lines lying beyond that point may be registered, as I have obtained impressions which are constant in each plate exposed. The past winter has been of a most unsatisfactory nature for this kind of work, and it is only at long intervals that I have been enabled to catch the Sun for this purpose. I am earnestly looking forward to brighter sunshine, when I have not the least doubt that I shall obtain sharp fiduciary lines in the ultra-red. The addition of any colour to the preparations has been anything but beneficial, retarding the action greatly; and, from what is apparent, the virtue of the dyes used consists simply in the fact that they are hydrocarbons of some kind, probably combined with the faint traces of silver always left in the film of the sensitive plate.

Experiments with potassium bichromate have also been undertaken; and the result shows that (where partially insolated) the rays which usually have no effect on the sensitive compound are capable of continuing the action set up, as I pointed out in the year 1872. Iron and uranium have also yielded prolonged spectra.

The first experiments were carried out with a single prism of 60°, and a lens to the camera of 4-feet focus; the later experiments have been made with a direct-vision spectroscope of 9 prisms, being equivalent to about three single prisms, and with 4 prisms in battery. The same camera and object-glass have been employed.

Observations of Coggia's Comet. By G. H. With, Esq.

During July 1874 I made numerous observations of Coggia's Comet, with Newtonian telescopes furnished with silvered-glass specula, of aperture varying from 8½ to 12¼ inches.

Notes of *three* of these observations may not prove uninteresting to the Fellows of the Society.

I also send copies of three sketches, made within a few hours of the time of each observation.

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